Next Generation Student Information Services

Project Summary Report: January 2018 – December 2019

(Updated March 2019)

ngsis.utoronto.ca

UNIVERSITY OF TORONTO

Overview

The goal of the NGSIS (Next Generation Student Information Services) Program is to create and deploy technological solutions that help students fully engage in rewarding learning experiences and achieve academic and personal success, and that help faculty and staff to provide a rich and supportive educational environment.

Through a targeted investment in information technology over the past six years, NGSIS has introduced a wide variety of new services for students and staff, providing real-time information about all aspects of the student experience.

Broad consultations with users of these services have assisted the technical teams in shaping our products to meet the specific needs of students, staff and faculty. As a result, NGSIS is now actively supporting over **25 individual student and administrative applications in addition to the current ROSI system.** Included in this list are some of the most successful NGSIS services for students such as ACORN, Degree Explorer, Transfer Explorer,

Convocation e-ticketing, and Course Finder. NGSIS has also released a variety of larger applications for faculty and staff, including Curriculum Management (CM), Course Information System (CIS), ROSI Express, eMarks, StarRez (residence management), applications to streamline curriculum, courses and programs while offering improved processes and reports for student accounts.

With a base of successful applications now in place, there continues to be a multitude of opportunities to distribute, integrate, and further leverage solutions and associated underlying information for U of T.

Focus for NGSIS
September 2018 to December 2019

1   **NGSIS Platform Modernization:** Modernize the existing ROSI infrastructure with a series of high-powered servers and refreshed code base to decrease cost and increase efficiency. Implement a new cloud-based reporting system allowing for secure access to ROSI data and underlying NGSIS application information.

2   **Course Information System:** Continued development of a new Course Information System (CIS), including refinement of the online exam submission process for instructors and new building blocks for an online syllabus application.

3   **ROSI Core Module Improvements:** Targeted improvements to ROSI core modules, including the implementation of Phase 1 of a new Financial Aid and Awards module for U of T and participation in Kuali Enrolment development.

4   **Service Innovation:** Continued rollout of web applications such as a student timetable builder, an exam invigilator application and a host of new features for ACORN.

5   **Curriculum Management:** Expansion of Kuali Curriculum Management (CM) and the U of T Calendar product (Curriculum Publisher) for other large divisions at U of T.

6   **Reporting, Planning and Analytics:** Expansion of data visualization services that allow insight into the student academic life cycle.

1 NGSIS Platform Modernization

For over three years, NGSIS worked to modernize the existing ROSI infrastructure with a series of high-powered servers and a refreshed code base. The NGSIS Platform Modernization Project, launched on November 19, 2018, was one of the largest of its kind to be undertaken at U of T. The new platform has improved system performance and capacity, and allows for real-time integration with enterprise systems. These improvements will increase the University's technological capacity to enhance services that will benefit students, as well as administrative staff through the NGSIS program.

Benefits

Permits 15,000 students to access the system via ACORN simultaneously versus the current 700.

Provides new option for PDF output.

Allows for a modern file management interface.

Works directly in popular web browsers.

Opens up the potential for live integration between divisional systems and ROSI.

Helps U of T stay at the forefront of technological innovation.

Project Implemented: November 19, 2018

Accomplishments and Initial Impact

- Over **200** User Acceptance Testing participants completed **500** test cases and helped to transition over **1,700** ROSI users.

- **6** large scale informational forums, including registrarial and technical attendees, and visits to **37** divisions.

- Information sessions, new website, workshops, webinars and hands-on help offered to support users for implementation.

- After cutover, only **3** regular users inquired about how to log into the new system.

- Bounce rate has dropped by **82** per cent. More students are accessing the application successfully and finding the information they need.

- Database server has **70** per cent more capacity.

- Session duration has decreased by **6** per cent while the number of pageviews has increased by **37** per cent.

ROSI Database   **ROSI Database Copy**   **Divisional Analysis & Reports**
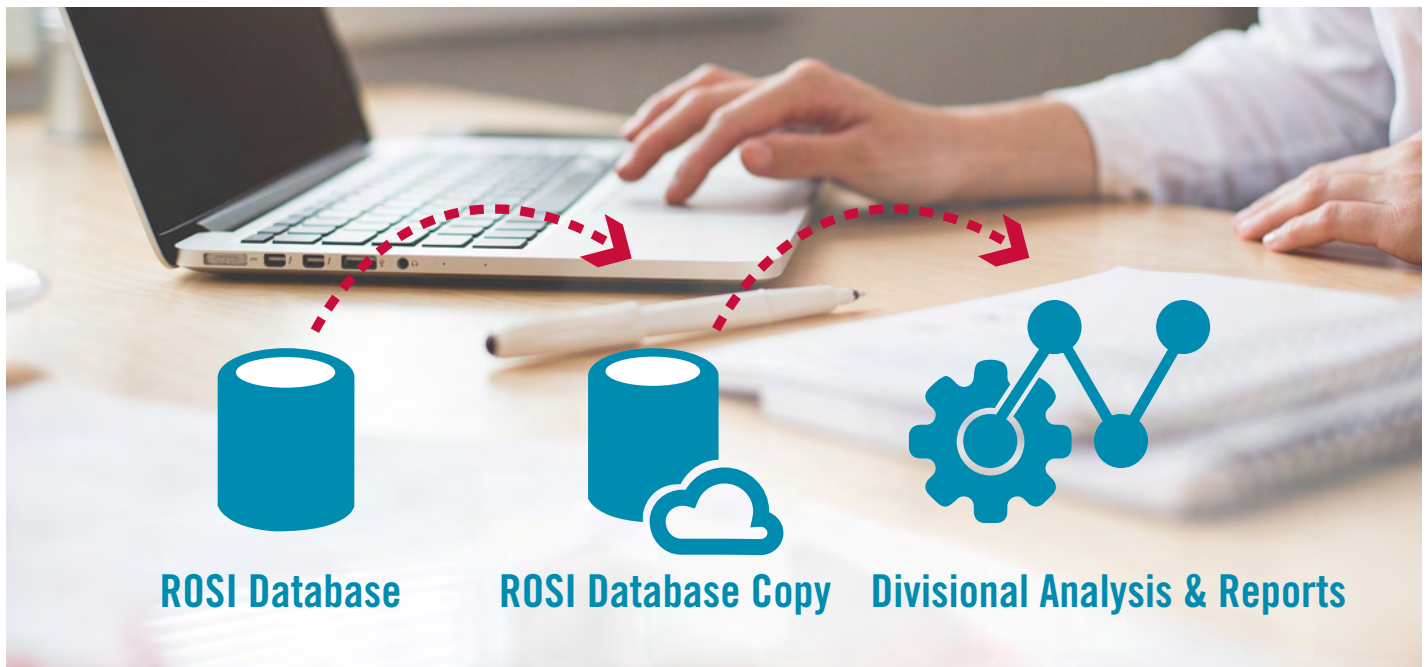
An important part of this project involves the implementation of a cloud-based copy of the ROSI database, called the Data Decision Support System, which allows staff to perform operational and analytical reports in near real-time.

Benefits:
- Near real–time access to ROSI data.
- 99.7% up time.
- Multiple user access 24 hours a day 365 days a year.
- Secure data storage at a Microsoft Data Centre.
- Data encrypted at rest and in transit.
- Ability to scale system resources up or down as needed.
- Faster access to data than ROSI.
- Access to modern analytic tools.
- Increased data security.
- Improved data governance (authorization and access).

Who Benefits?
Students
- Enhanced user experience since students no longer need to compete with administrative staff for processing power.

Rocket Shuttle Users
- Faster queries with access to real-time data.
- Enhanced scheduling of queries.

Divisional Leadership
- Improved decision making capabilities with up-to-date data.

Future Plans:
Divisional Data Stores
Divisions can store their data in the cloud and lower data maintenance work.
- Information is secure, requires no physical administration and enables automatic backups.

Data Lake Pilot
A secure storage repository holding vast amounts of raw data in its native form such as Word, Excel, etc.
- ROSI data (available for analysis outside of ROSI) in near real-time.
- Central and divisional data can be combined with the Data Decision Support System for comprehensive analysis.

Data Science Virtual Machines
Cloud environment for Data Science and Artificial Intelligence development featuring the latest tools.
- Secure access to Artificial Intelligence and Machine Learning platforms.
- On-demand elastic capacity.

Phase 1 access for Rocket Shuttle users is planned for May 2019.

2 Course Information System

The Course Information System allows for the collection and dissemination of pedagogical information, as well as the integration of this information with key administrative processes and systems at U of T. It streamlines syllabi and exams processes for instructors and administrators, and helps students to make better-informed decisions about their education.

Since 2016, the project team has been running successful pilots in select departments in the Faculty of Arts & Science, the Faculty of Applied Science & Engineering and the University of Toronto Scarborough. Over the next few months, and into 2020, the team will expand participation to the John H. Daniels Faculty of Architecture, Landscape and Design, the Faculty of Kinesiology & Physical Education, and the University of Toronto Mississauga.

Current Functionality:
The **Exam Module** in CIS now has a complete, electronic end-to-end exam workflow. This process allows instructors to enter exam details, print options and upload their exam. Department administrators and chairs are then able to review and print exams, or electronically send them to an approved print location.

The **Syllabus Module** has implemented three areas of functionality:

- **Basic Course Information:** This information provides instructors with a high-level overview of important information regarding their course such as sessional dates, requisite information, and lecture times and locations.

- **Marking Scheme:** This function allows instructors to complete the grading assessments for their course and receive immediate feedback regarding Faculty and University policies and guidelines.

- **Syllabi Policy and Procedure Statements:** This section allows instructors to select from a list of required, recommended, and optional Faculty and University policy statements. They also have the option to revise these statements or create their own, and save them for later use.

Future Functionality:
Looking ahead, CIS is planning for future releases that will include the following enhancements:

- Enhancements to the existing user interface to increase usability (Spring 2019).

- The management of cross-listed and grouped courses, both within divisions and across multiple divisions for syllabus functionality (Spring 2019).

- The upload and archiving of syllabi within current terms to support administrative functions and record keeping (Spring 2019).

- The option for instructors to create a complete syllabus document and retrieve archived syllabi on CIS (Summer 2019).

- A configuration module to allow administrators to customize existing functionality (Fall 2019).

- A full suite of tools supporting reporting and analysis within departments and divisions (2020).

- Integration with Library Services to allow for the automatic, electronic, archival of exams (2020).

In addition to these enhancements, CIS will add special functionality for accommodated tests and exams, including integration with Accessibility Services, and Test and Exam Services (TES). Scheduled to start in May 2019, the project will leverage NGSIS products to introduce significant benefits to students registering for accommodated test writings; instructors providing test details and documents, and; administrators tasked with keeping TES processes working efficiently and in a timely manner. Full implementation of the project is expected to take approximately 18 months.

Departments currently using CIS include:

Faculty of Arts & Science
- Department of Geography
- Department of Economics
- Department of Mathematics
- Department of Computer Science
- Human Biology Program
- Department of Psychology
- Department of English
- Department of Statistical Sciences
- Department of Ecology and Evolutionary Biology
- Victoria College

University of Toronto Scarborough
- Department of English
- Department of Computer & Mathematical Science
- Department of Human Geography
- Department of Political Science

Faculty of Applied Science & Engineering
- Cross–Disciplinary Programs
- First-year Courses

3   ROSI Core Module Improvements

Large projects are underway to transform the backend modules of ROSI, allowing the University to respond effectively to the demand for new services both within U of T and from the province and external agencies. In 2018, the team completed the implementation of the provincially mandated net tuition billing program. In 2019-20, the focus will be on the implementation of a new Financial Aid and Awards module and the Student Choice Initiative, and further development of a new course and program enrolment module through our partnership with Kuali Inc.

Financial Aid & Awards
(Vendor Implementation – Summer 2019)

Improved awards handling has been cited as a high priority project for NGSIS by both students and administrators. An ideal solution would proactively identify financial aid and award opportunities for students, improve alignment of funding with donor agreements, maximize funding resources, and avoid overpayment to students due to a lack of co-ordination and information sharing.

Following the completion of a formal RFP process, and consultation with a cross-functional user group at the University, a vendor has now been selected and work is underway to finalize the contract. Implementation will be broken into a number of phases over the next three years:

1. Implementation of a new consolidated "read-only" inventory of awards which is searchable and accessible to the public (Summer 2019).

2. Implementation of new processes allowing for students to apply online along with automated matching routines which proactively match students to award opportunities (Winter 2020).

3. Integration of the new financial aid and awards module with our financial information systems (2020).

Student Choice Initiative (July 2018)

The University is currently reviewing its ancillary fees and identifying those that are not considered mandatory in accordance with a recent provincial government mandate. This initiative has far reaching impacts within our ROSI and financial systems and will affect a number of business processes and organizations right across the University. EASI is working closely with the Vice Provost of Students to ensure that students can opt out of non-essential tuition fees for 2019 Fall Winter Academic session.

OSAP & Net Tuition (July 2018)

Changes to ROSI and ACORN have been implemented to meet new requirements mandated by the province to improve tuition billing processes. As of August 2018, the University has been accepting and processing OSAP student payments directly from the province, and, along with identified institutional aid, applying these amounts directly to the student's account in advance of required tuition payments.

The implementation of the Net Cost View Statement (tuition, compulsory fees and residence, less OSAP funding) within the financial section of ACORN was part of this project and was completed in mid August.

Kuali Enrolment

NGSIS has been working with the Kuali Inc. development team to create a cloud-based student system capable of managing U of T registration requirements. The scope of development includes course offerings, program offerings, course and program registration and some aspects of academic record.

Kuali is currently evaluating options to accelerate development of this module through a new capital investment proposal which would significantly boost project resources, broaden the participation of partner institutions, and lessen the burden on U of T to contribute resources to the project. The NGSIS Executive Sponsor Committee is currently evaluating the benefits of this new model in relationship to the needs of the NGSIS stakeholder community and new estimated timelines for delivery.

4 Service Innovation

At the core of NGSIS is service innovation, resulting in new applications that consolidate online services for faculty, staff and students, simplify operations, and empower students to make informed decisions across their lives at U of T. New and improved web applications delivered or underway by the NGSIS team include the following:

Projects Underway

Option for PDF Version of Academic Transcript (Spring 2019)
This new service will be developed within ACORN to allow for quick and convenient access to an official electronic PDF version of the transcript for students. The solution is tied to the selection of an external vendor (RFP) who will securely distribute the transcript to the recipient from ACORN.

Convocation E-Ticketing Phase II (Spring 2019)
Further improvements to the Convocation system are expected to offer enhanced ticketing functionality. This includes the ability to display a list of graduation records belonging to a student by entering a student number or surname, and the ability to print initials within a graduate's name on a diploma, President's letter, label and graduation letter.

Convocation Diploma Replacement Phase II (Spring 2019)
The next phase of Diploma Replacement will add new functionality within ROSI Express to record the history of all reprint requests processed by the Convocation Office.

Timetable Builder Expansion (Fall 2020)
The ACORN Timetable Builder will allow students to craft and optimize their course schedule. After a successful pilot at UTSC, this service will be enhanced and released more broadly across the University to students in additional divisions. Improvements to the Timetable Builder will include functionality from **Course Finder**, allowing for the subsequent retirement of this product. Timetable Builder will become the new and improved Course Finder.

Sun-Setting Online Calendar (Winter 2020)

The Online Calendar (OLC) application will be retired by implementing Curriculum Publisher (specialized web CMS for calendar production) for the remaining divisions currently using OLC. This may also require the implementation of Kuali Curriculum Management as necessary for these divisions.

Transfer Explorer / Transfer Navigator Replacement (2020)

This initiative will explore and recommend options to replace the existing vendor-based application and database engine. Formal project kickoff will commence following product recommendation.

Exam Invigilation Application (2020)

The exam invigilation application allows an exam invigilator to validate a student's TCard and photo ID using a tablet application. The application provides real-time data exchange and integration with ROSI as well as U of T's central photo database. The University of Toronto Scarborough and the Faculty of Arts & Science will continue to pilot this application over 2019.

Curriculum Management Integration (Rules Integration 2020)

This integration will allow Degree Explorer (DE) to view text-based rules stored within Curriculum Management in order to ease the burden of translating these rules into the codified rules builder in DE. Further work is required to determine the best location for future CM, enrolment and DE rules. Opportunities to use Machine Learning (ML) to ease the burden of manual rules translation between products will be considered.

Accessibility (Ongoing)

NGSIS is continually focused on accessibility and implementing improvements to ensure full AODA compliance (WCAG Level AA) for all applications. Most recently, Degree Explorer became AODA compliant in Summer 2019.

ROSI – Student Web Services Sunsetting (Complete – February 2018)

In February 2018, ACORN became U of T's single student web service. ROSI-SWS was revised to become "ROSI Alumni Transcripts" with reduced functionality to facilitate transcript requests and PIN resets. Reports and JOINid/early UTORid processes were extended to ensure that all newly admitted students have access to ACORN in time for course selection and fee payment.

Safety Abroad (Complete – February 2018)

This new, centrally supported application replaced a legacy application in Student Life. Safety Abroad tracks student placements abroad along with their emergency contact information, allowing them to safely expand their horizons and deepen global engagement. If a country's risk level increases, according to Global Affairs Canada (GAC), the application helps staff quickly identify where students are located in a country, state or municipality and provides up-to-date contact information. Future enhancements will include more advanced communications and emergency response functionality while abroad.

Convocation Diploma Replacement Phase I (Complete – March 2018)

Convocation Diploma Replacement is a new function of ROSI Express for the Office of Convocation staff. It provides a single system for printing and replacement printing of all diplomas, degrees and certificates. It also eliminates the maintenance of an external system, duplication of work, and ensures faster production and increased quality control of diplomas.

Degree Explorer (DE) Administrative Interface (Complete – August 2018)

A rewrite of the current Degree Explorer Administrative interface has enhanced performance and maintainability and allows administrators to monitor students' academic records and progress towards graduation. Additional enhancements include Course Management integration and improved functionality for the Faculty of Applied Science & Engineering users.

Global U (Complete – September 2018)

The Global Scholars program is a University-wide initiative to encourage and support students in the inclusion of international elements in their academic program. Undergraduate divisions now have the opportunity to develop Type 2 Certificates recognizing curricular activity in support of this program.

Online Admissions Deposits (Complete – December 2018)

This new ACORN feature has been deemed a priority for the institution and will automate the admission deposits process, making it available to more divisions as an enrolment management tool and allowing students to use credit cards for payment.

5 Curriculum Management

Curriculum Management (CM) (Ongoing)

Curriculum Management was the first product to be delivered through our partnership with Kuali Inc.

The product allows divisions to create, maintain and retire courses and programs using customized divisional governance processes, and in tandem, allows NGSIS to create a central repository of courses and programs for U of T.

In 2016, CM was successfully rolled out to the Faculty of Arts & Science, University of Toronto Scarborough and John H. Daniels Faculty of Architecture, Landscape and Design. The Faculty of Kinesiology and Physical Education is implementing CM for the 2018-19 governance cycle. We are currently in discussions with five divisions about implementing CM in the Fall 2019/Winter 2020.

Over 2017-18, the team automated many of the committee governance reports. Divisional users are now able to generate reports for governance committee meetings and post–approval registrarial processes, as well as to identify missing or problematic CM data. The team has also developed an extract process for the transfer of course/program data from CM to Curriculum Publisher (CP).

Functional improvements already implemented for the 2018-19 governance cycle include an improved activity log, and the ability to submit revisions and corrections. A more flexible workflow tool will be implemented for the next governance cycle.

Curriculum Publisher (CP) (Ongoing)

CP is a U of T developed content management website that optionally interfaces with Kuali CM, allowing divisions to publish a public facing calendar copy of their curriculum.

Curriculum Publisher sites are now in place for Arts & Science, UTSC, SGS, Daniels Faculty of Architecture and the Faculty of Medicine MD program.

The Faculty of Kinesiology and Physical Education is implementing CP for the 2018-19 governance cycle.

Maintenance of these sites is ongoing, and additional divisions will be added as CM continues to roll out.

6 Reporting, Planning and Analytics

The Business Intelligence planning and analytics team has played an integral role in warehousing information on course and program enrolments, student housing, student awards and co-curricular activities. Through a variety of specialized tools, administrators can use this information to view application and admissions rates, take appropriate action to improve student retention rates, and refine curriculum. Priority projects for the current timeframe include:

Retention and Graduation Rate Analysis - Phase 1 (Winter 2019)
The purpose of this project is to better understand the student admissions to graduation life cycle with a view to helping students at the University of Toronto be more successful by using data analysis to identify and isolate potential barriers to success.

The project will provide data and reporting tools related to retention, persistence and graduation of students in direct entry undergraduate programs.

The project will track students through multiple stages:
- **Retention:** Students' outcomes from Year 1 to Year 2.
- **Persistence:** Students' outcomes from year to year for years beyond Year 2.
- **Graduation:** Students' outcomes from admissions to graduation, including by year of graduation.

The intended usage of the data will be to provide users the ability to:
- Review student attributes to identify opportunities for improvement at the curricular level.

- Track trends in retention, persistence and graduation rates.

- Identify factors affecting retention, persistence and graduation outcomes.

- Provide dashboards and analysis to provide insights on factors influencing time to graduate at the aggregate level.

Some examples of the data being analyzed in this project are:
- Cohort binning of students in order to identify the number and percentage of newly admitted students who return, graduate or are inactive

- Course enrolment data to analyze student performance and identify barriers to success such as waitlists.
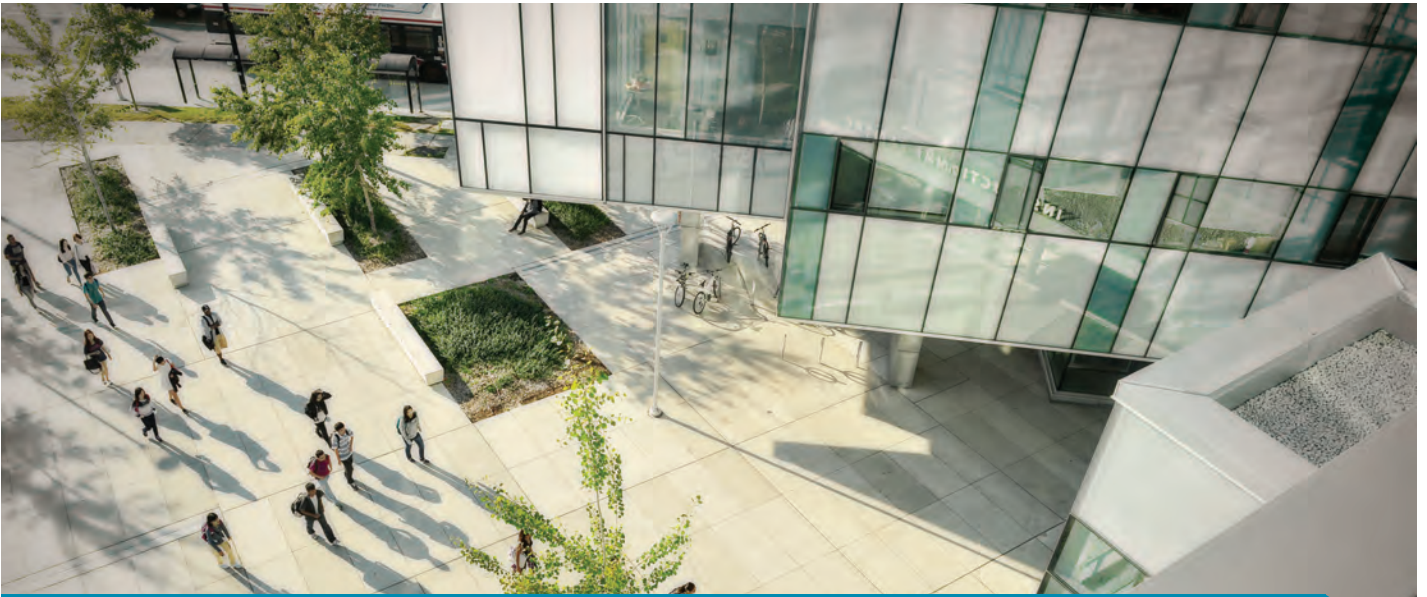
Operations

ROSI Change Advisory Board (Ongoing)

The ROSI Change Advisory Board (CAB) is a body that establishes priorities and directives for implementing ROSI enhancements. This dynamic board was established in May 2016 on a model of collaborative governance. The 20 member committee is made up of tri-campus functional representatives (mostly central and cross-divisional associate registrars) and technical leads and managers from EASI.

Members of the ROSI CAB are very familiar with the platform on which U of T's institutional and student information sits. They are also mindful of trends in higher education as they affect records and registration systems, and constraints of the current ROSI system.

Since its inception, this board has reviewed and prioritized over 80 ROSI Enhancement Requests received from 15 units across U of T. It has now become a model for other student information system applications.

Examples of Completed Enhancement Requests:

- Refined fields in ROSI for error management, government reporting and interoperability with other systems.

- Blocked students from removing themselves from courses marked Grade Withheld Pending Review.

- Disabled UTORid for expelled students.

- Created a batch upload to add transcript notations for award citations.

- Limited students' maximum course load per term (versus academic session).

- Linked lectures with specific tutorials in ACORN.

- Enhanced data extracts to support divisional needs.

Examples of Enhancement Requests Under Consideration:

- Integrate data and procedures between ROSI and the TCard Office to better manage student names and immigration status.

- Improve management of 'repeatable' courses (e.g., selected or special topics courses) allowing students to enrol on ACORN.

Examples of Ongoing or Approved Requests:

Ministry of Training, Colleges and Universities Support (Ongoing)

Continue to support the ROSI MTCU Extract and Submission process.

OUAC Maintenance (Ongoing)

Continue to analyze the impact to the ROSI admission process and make changes based on requests received from the Ontario Universities' Application Centre (OUAC).

ROSI – Slate Integration

Analysis of enhancements for integration of Slate, the new Enrolment Services admissions tool, with ROSI to improve ongoing operations.

Refactoring ROSI Course Instructor Assignments (Summer 2019)

Investigation of solutions to better manage identification of faculty and staff from the University and the Federated Colleges in order to assign instructor and coordinator roles in courses for ROSI and the CIS.

Completed Projects

Glassfish 2 – JAVA 6 Updates (Complete – Summer 2018)

Updates to ROSI Express (RXP) to migrate from the existing infrastructure (Glassfish 2) to a newer, more modern platform (IBM). This new version of RXP will initially be delivered to run in parallel to the current production system. This is an essential pre-requisite for the NGSIS Platform Modernization project.

ACORN Functional & Technical Debt (Complete – Fall 2019)

Work to address various updates requested by stakeholder groups, as well as re-writing code to address deficiencies, and add more comprehensive test cases, etc.

Operational and Administrative Reporting (Partially Complete – 2018-19)

Reviewed options for a new reporting tool to allow for the development of user-friendly online reports for the student information system.

ROSI Performance Enhancements (Complete)

In preparation for the Faculty of Arts & Science "priority drop" enrolment period, the peak enrolment day for U of T, the NGSIS team implemented low-investment, high value improvements to ACORN. Improvements included optimizing Weblogin to better handle the large volume of login requests, as well as a 'webload management day' waiting page where if students tried to log in to ACORN before their scheduled start time, their session would be kept active and prevent Weblogin from having to process repeated login attempts. This further improved the system's overall performance.
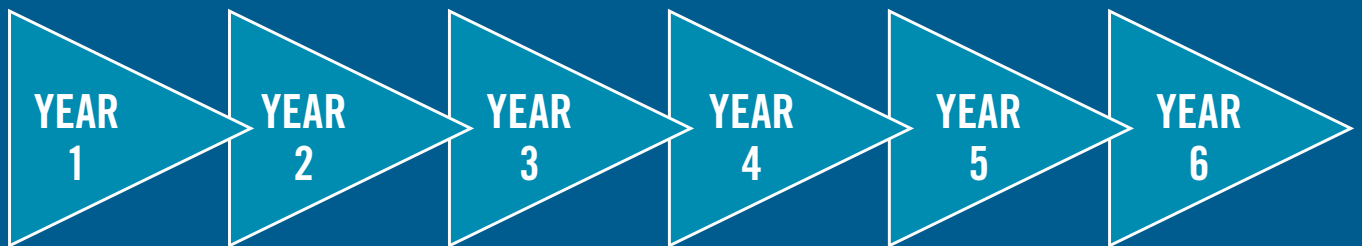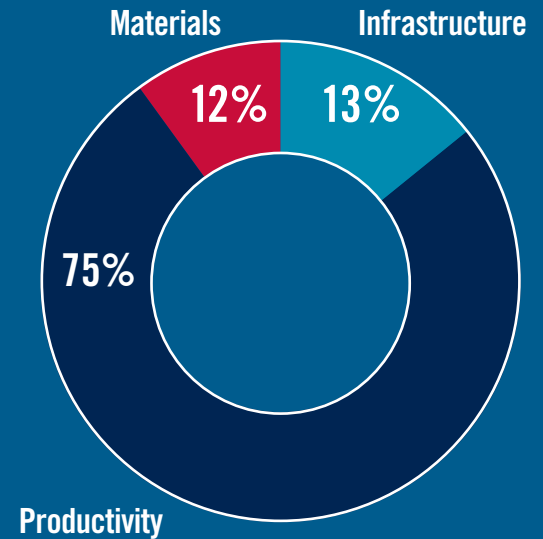
The team also increased the duration and volume of cached registration information in the system to improve performance. If an individual student made an unusually rapid number of requests, they would automatically be prompted to prove that they were a human via a "captcha."

Facts and Figures

Savings Analysis 2012–19

Project Name	Estimated Savings
Degree Explorer (6 years)	$1,592,160
My Res (6 years)	$232,656
StarRez (6 years)	$561,736
eMarks (4 years)	$293,344
Photo Invigilation (based on UTSC) 2 years	$73,000
Varsity Blues (6 years)	$25,254
Student Accounts (SCLM) (2 years)	$61,576
Curriculum Publisher (2 years)	$154,600
Course Information Systems (2 years)	$284,314
Transfer Explorer (4 years)	$53,664

Materials 12% Infrastructure 13% Productivity 75%

YEAR 1 ▶ YEAR 2 ▶ YEAR 3 ▶ YEAR 4 ▶ YEAR 5 ▶ YEAR 6 ▶

Savings: $3,332,304

Where NGSIS is Making an Impact

9 tons of paper eliminated per year and **213** trees saved.

12,295 employee hours saved per year.

Webpage Views Feb 1, 2018 – Feb 1, 2019

ACORN
127,875,429

MyRes
146,211

Degree
Explorer
1,319,091

Course
Information
System
63,621

Timetable
Builder
49,451

Transfer
Explorer
87,922

Financial
Planner
133,449

Course Finder
1,658,305

StarRez
1,854,621

Reporting, Planning and Analytics

78 Cubes
440 Reports

1.6 Terabytes
of Data